

## MAG Process Gas Chromatograph



**MAG** is a modern process gas chromatograph, developed by **BACS LLC** to simplify and improve the process measurement.

MAG GC is intended for on-line measurement and process control in oil and gas, refinery, coal, petrochemical, chemical, air separation and other industries.

### Our priorities

- Performance
- Reliability
- Flexibility
- Convenience
- Cost-efficiency

### Support & Service:

BACS provides various ways of warranty and support programs including factory & end-user side training, phone & web assistance and customizable solutions for wide range of applications.

For more information on any of our products or services please visit us at: [www.bacs.ru](http://www.bacs.ru)

### Key benefits

#### Superior Performance

- ✓ Five types of detectors: **TCD**, **CCD**, **FID**, **ECD** and **ED** (for sulfur)
- ✓ Analyzed media: gas, liquefied gas or liquid
- ✓ High measurement accuracy and fast analysis
- ✓ Built-in sample stream selector for up to 6 analyzed lines
- ✓ Compliance with international standards

#### Flexile Design

- ✓ Compact design with Ex d explosion-proof enclosure
- ✓ Flexible modular configuration with up to 4 analytical channels
- ✓ Integrated power supply unit 220V
- ✓ Optional injector-vaporizer for liquid samples
- ✓ Optional heated gas inlets for lossless heavy samples injection

#### Improved Usability

- ✓ 12" LCD touch screen with user-friendly interface
- ✓ Automatic operation due to built-in PC with nonvolatile memory
- ✓ Flexible PC software for remote access, settings and data acquisition
- ✓ Wide variety of the data transmitting opportunities
- ✓ External pressure sensors for carrier and test gas cylinders

#### Cost-efficiency

- ✓ Low power and gas consumption
- ✓ No instrument air or other auxiliary gases required
- ✓ Easy maintenance with low service cost

## CONFIGURATION FEATURES

### Modular configuration

MAG GC contains up to **4** independently heated **analytical channels**. Each channel consists of 1 detector, 1 sampling/switching diaphragm valve with backflush option and column system suitable for the particular application. Flexible modular construction allows choosing proper configuration for wide variety of applications.



Analytical GC channel

### Detector types

✓ **Micro-volume thermal-conductivity detector (TCD)**

Allows to use packed, micro-packed or capillary columns. Provides fast response and low detection limits.

✓ **High-sensitive catalytic combustion detector (CCD)**

Provides accurate measurement of low concentrations of combustible compounds including hydrogen, hydrocarbons etc.

✓ **Selective electrochemical detector (ED)**

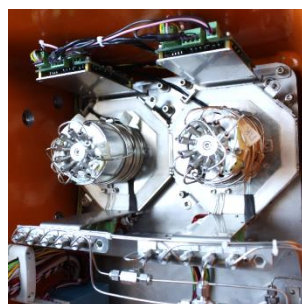
Allows to analyze low concentrations of sulfur-containing compounds using only air as a carrier gas. Provides great linearity in wide measurement range and low cross-sensitivity.

✓ **Flame ionization detector (FID)**

Has high sensitivity to organic compounds and wide linear range.

✓ **Electron capture detector (ECD)**

Is widely used to determine the content of halogen-containing organic compounds, for examples, in petroleum and pesticides.



Micro-volume TCD

### Liquid sample injection system

Optional external **heated sampling valve** or **injector-vaporizer** provide direct introduction of vaporized liquid sample into analytical column without any losses of analyzed compounds. Maximum temperature of the injector is 220°C.



Injector-vaporizer



Heated cabinet for MAG GC with cylinder's cabinet

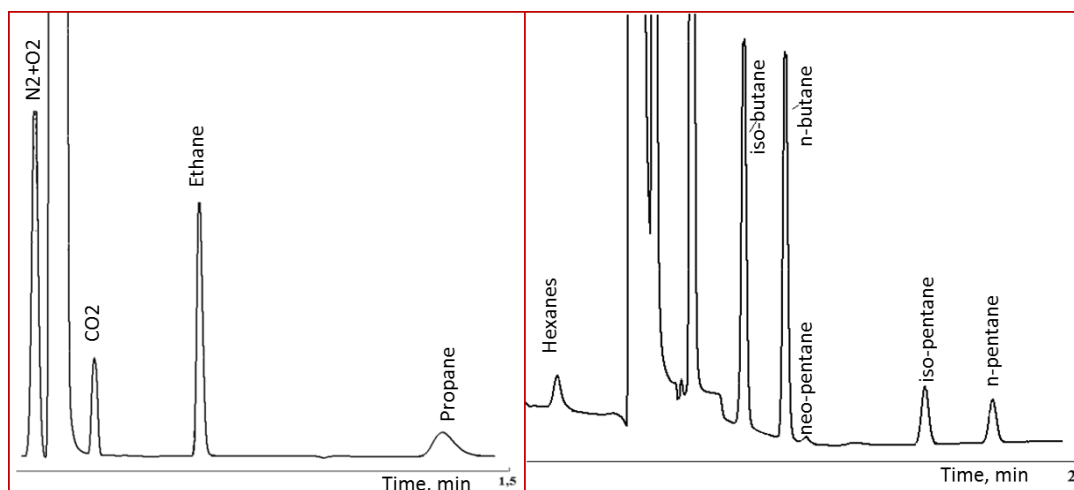
### Heated cabinet embodiment

MAG GC can be placed into a heated cabinet instead of using instrument's shelter which is more cost-efficient solution.

The cabinet includes everything that is needed for GC: sample conditioning system, calibration gas cylinder, cylinders with carrier gas, controlled heating and lighting systems.

## EXAMPLES OF APPLICATION

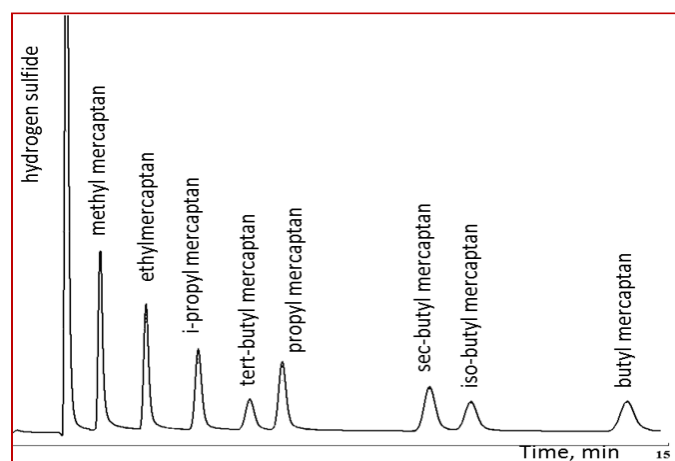
**Analysis of natural gas composition** according to **ISO 6974**, **GPA 2261** with **calculation of calorific values**, relative and absolute density, compressibility factor and Wobbe index in accordance with **ISO 6976**, **GPA 2172**, **AGA-5**, **AGA-8**.



### Configuration and parameters

- ✓ Two analytical channels with  $\mu$ -TCD;
- ✓ C6+ backflush precolumn;
- ✓ Total analysis time – up to **5 min**;
- ✓ Carrier gas (He) consumption – up to 12 ml/min (one 40 L cylinder per year).

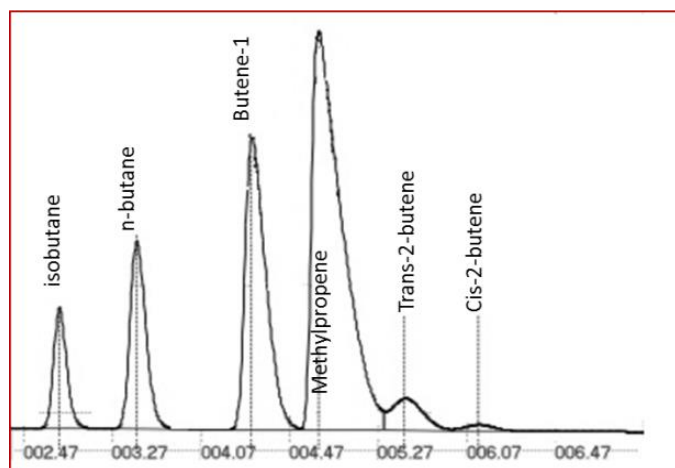
Compliance with **international standards**, availability **OIML R140:2007** "Measuring systems for gaseous fuel" and **Welmeq 7.2.2018** "Software Guide (Measuring Instruments Directive 2004/22/EC)".



**Determination of sulfur-containing compounds** in natural gas including **H<sub>2</sub>S** and **mercaptans** and following calculation of total and sour sulfur according to **ASTM D 7493**, **ISO 19739**.

### Configuration and parameters

- ✓ Analytical module with high-sensitive electrochemical detector;
- ✓ No interference with hydrocarbons;
- ✓ Compressed air as a carrier gas;
- ✓ No auxiliary gases required;
- ✓ Analysis time – up to 15 min.



**Quality control of light hydrocarbons**, trade and technological NGL, LPG, olefins, pentane-hexane fraction, control of isomerization, quality control of incoming raw materials and final products at gas treatment and refinery plants.

### Configuration and parameters

- ✓ Liquid sample injection system with an external heated pneumatic-actuated sampling valve;
- ✓ Vaporization and injection without losses of analyzed sample;
- ✓ Max. sample pressure: 70 bar;
- ✓ Max. valve temperature: 220°C.

## SPECIFICATION

### Technical characteristics

<b>Q-ty of analytical channels</b>	Up to 4 (1 channel consists of 1 detector, 1 sampling valve with backflush option and column system)				
<b>Oven type and temperature</b>	Airless, isothermal, from 60 to 150°C				
<b>Chromatographic columns</b>	Capillary, micropacked, packed				
<b>Q-ty of analyzed streams</b>	up to 6 analyzed streams (including calibration mixture)				
<b>Analyzed media</b>	Gas, liquified gas or liquid				
<b>Carrier gas</b>	He, Ar, N <sub>2</sub> , H <sub>2</sub> or air (for ED and CCD)				
<b>Carrier gas consumption</b>	5 - 30 cm <sup>3</sup> /min (depending on application)				
<b>Operation mode</b>	Automatic, controlled by internal PC with integrated software				
<b>Display and data input</b>	12" LCD with touch screen (option)				
<b>Communication interfaces</b>	<b>Standard</b>	RS 232/485 (ModbusRTU) – 2 pcs., Ethernet (ModbusTCP) – 1 pc., Discrete inputs (NAMUR) – 4 pcs. (optionally extendable)			
	<b>Optional</b>	RS 232/485 – extra 1 pc., 4-20 mA – up to 16 pcs., Discrete outputs, optical Ethernet, GSM/GPRS			
<b>Power supply</b>	110-220 V, (50±1) Hz				
<b>Power consumption</b>	up to 180 W (warm-up); up to 80 W (steady mode)				
<b>Explosion protection, IP rating</b>	1Ex d IIB T4Gb or 1Ex d IIB+H2 T4 Gb, IP65				
<b>Ambient temperature range</b>	From -10 to +50°C				
<b>Weight, kg</b>	No more than 40 or 58 (depending on version)				
<b>Dimensions (L×W×H), mm</b>	400×300×481 or 436×318×607 (depending on version)				

### Performance capabilities

Detector	TCD	CCD	ED	FID	ECD
<b>Detection limit</b>	2 ppm (for hydrocarbons)	0,5 ppm (for hydrocarbons)	0,01 ppm (for H <sub>2</sub> S)	0,05 ppm (for hydrocarbons)	0,05 ppm (for CHCl <sub>3</sub> )
<b>Repeatability</b>	1% (for gas), 2% (for liquid)	1%	2%	1% (for gas), 2% (for liquid)	2% (for gas), 4% (for liquid)
<b>Analysis time</b>	From 2 to 20 minutes (depending on application)				
<b>Calorific Value Calculation Performance (according to OIML R140:2007)</b>					
<b>Accuracy</b>	0,2%		<b>Repeatability</b>	0,05%	

### Custom solutions

We are able to design a custom analytical solution for your specific application. For more information please don't hesitate to contact us.

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